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## Identifying Energy Efficiency Opportunities

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### Introduction

#### Cost Savings – Areas of Focus:

- Energy Bills
- Lighting
- Electrical Motors
- Variable Frequency Drives
- Air Compressors
- HVAC
- Case Studies

#### Energy Bills – Understanding Utility Bills

- Gas Bills:
  - Fixed Charge or Customer Charge
  - Usage Based
  - Sales Tax
  - Commodity Cost
- Electrical Bills:
  - Fixed Charges
  - Demand Charges (based on kW)
  - Energy charges (based on kWh)
  - Sales Tax
  - Power Factor Penalty
  - Third Party Provider?
- What is Demand?
  - Cost of Electricity Being Available
  - Calculated on Highest 15 Minute Usage Rate (kW) during Peak Hours
- Load Factor:
  - kWh for the Period: Peak kW x Total Hours in the Period
  - Ideally 80% for Three Shift Operation
- Power Factor:
  - kW / Voltage x Amperes
  - Generally 0.80 or Greater to Avoid Penalty
- General Electrical Cost Savings
  - Install Electrical Meters
  - No Sales Tax on Manufacturing Usage
  - Shift Usage to Off-Peak
  - Reduce Demand Peaks

### **Lighting – Most Common Recommendation:**

- Replace Metal Halide with Fluorescent Fixtures
- Fluorescent: T5 or T8
- Typical Payback: One to Two Years
- Often Use Motion Sensors and Light Harvesting

### **Electrical Motors:**

- Three Phase
- Single Phase
- Determine Cost of Operation:
  - $\text{kW} = \text{HP} \times .746 \text{ kW/HP} \times \text{Motor Loading} / \text{Efficiency}$
  - $\text{kWh} = \text{kW} \times \text{Annual Operating Hours}$
- Motor Cost Savings Opportunities:
  - Replace with Higher Efficiency Motor
    - Savings Depends on Hours of Operation
    - Payback can be two years or less
  - Install Variable Frequency Drive
    - Must have Variable Load
    - Often one-year payback or less

### **Air Compressors:**

- Most Expensive Utility
- Common Opportunities:
  - Excessive Operating Pressure
  - Leakage
  - Piping and Receiver Design
  - Lower Compressor Air Intake Temperature
  - Recover Exhaust Heat

### **Heating and Ventilation – Types of Heating:**

- Hydronic- water/steam
- Forced Air furnaces
- Radiant
- Heat Pumps

### **Heating and Ventilation – Areas of Focus:**

- Boiler Replacement
- Air Conditioning Replacement
- Heat Pumps
- Control Changes

### **Boiler Replacement**

- Types of Boilers:
  - Fire Tube
  - Water Tube
  - Cast Iron
  - Modular Water Tube
  - Modular Condensing Water Tube
- Boiler Cost Savings Options
  - Modular Condensing Boilers
  - Recover Waste Heat
  - Burner Replacement
- Charlevoix County Courthouse
  - Replaced Old Boilers with Modular Condensing Boilers
  - Resulted in a 45% Decrease in Fuel Costs

### **Air Conditioning / Heat Pump Replacement**

- Efficiency Ratings in SEER and EER
- Typical Efficiency Ratings
  - Air Conditioners
  - Heat Pumps
- Air Conditioning Cost Savings Options

### **Control Changes**

- Variable Hydronic Heating Temperature
- Variable Hydronic Heating Flow
- Variable Air Makeup
- Time of Day Thermostat or Central Control
- Control Changes Cost Savings Options

### **Energy Assessment Programs**

- Better Buildings (Detroit Commercial) – no cost – (313) 237-4601
- Clean Energy Coalition – fee based – (734) 585-5720 ext.11
- Delta Institute – fee based – (517) 482-8810
- Green Lodging Michigan – no cost – (517) 241-6224
- Industrial Assessment Center – no cost – (734) 647-4790
- Michigan Energy Options – fee based – (517) 337-0422
- Michigan Farm Energy Audit Program – \$500 – (517) 353-0643
- Michigan Industrial Energy Center – no cost – (734) 763-7470
- Michigan Manufacturing Technology Center – fee based – (888) 414-6682
- Michigan RETAP – no cost – (888) 749-7886
- Rebuild Michigan – no cost – (517) 241-6281
- WARM Training Center – fee based – (313) 894-1030

### **Michigan RETAP – Retired Engineer Technical Assistance Program**

- Onsite Pollution Prevention & Energy Conservation Assessments Conducted by Teams of Retired Engineers
  - Free
  - Confidential
  - Non-Regulatory
  - No Obligations
  - Objective
- Michigan RETAP Contact Information
  - David Herb: 800-662-9278 or herbd@michigan.gov
  - Retired Engineer Technical Assistance Foundation 888-749-7886

### **Energy Assessment Success Stories - RETAP**

- Seimens Industries, Benton Harbor, MI
  - RETAP Helps Siemens Save Over \$125,000 Annually
- Flexfab, LLC, Hastings, MI
  - RETAP Helps Flexfab Save Over \$162,000 Annually